CORRECTIVE ACTION PLAN

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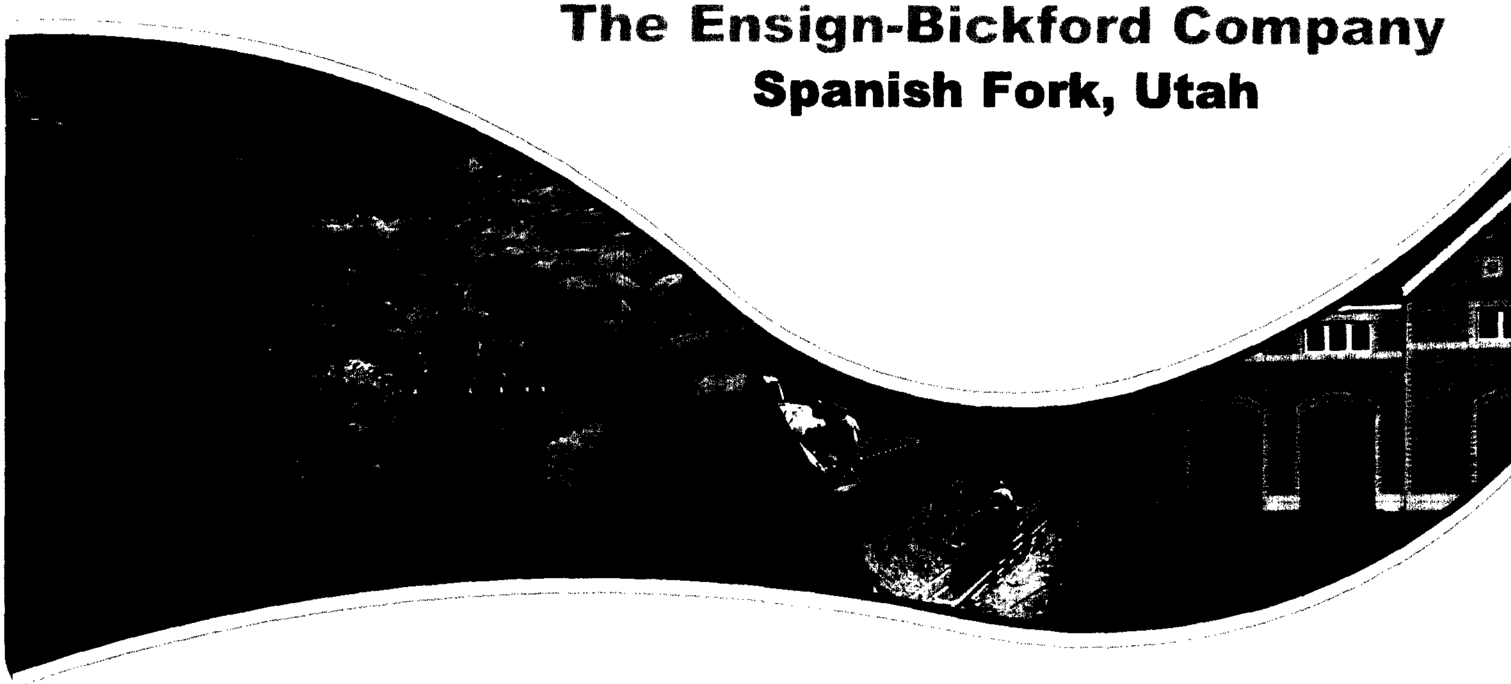
WATER QUALITY

The Ensign-Bickford Company
Spanish Fork, Utah



CHARTER OAK
Environmental Services, Inc.

***Revised* May 2002**

12.0 PROPOSED FUTURE CORRECTIVE ACTION ACTIVITIES

12.1 Recovery Well Installation

No additional recovery wells are proposed at this time. Future data collection may indicate that recovery well operations should be modified.

12.2 Recovery Well Operations

It is expected that all recovery wells will be operated on a nearly continuous basis for at least the next year with the exception of maintenance issues or planned shut-down for data collection. Decisions regarding future recovery well operations will be made annually and presented in an annual report.

During 2000 and early 2001, several operational issues developed with respect to Orton-23. Over time, pumping water levels in Orton-23 had fallen below the uppermost perforated interval in the well. This is probably a function of both regional water level declines and well losses resulting from poor well efficiency. As a result, higher amounts of suspended solids were observed, as well as the entrainment of tiny bubbles of air in the pump discharge. The higher suspended solids and air entrainment was believed to be caused by cascading water entering the well casing from the upper perforated interval, although this cannot be confirmed. While the entrained air bubbles apparently had no adverse affect on pump or GAC treatment system performance, the increased suspended solids required more frequent changes of the GAC treatment system filter bags and may reduce the life of the Orton-23 pump system. Also, the entrained air required full use of the air-release vents in the treatment system and cause operational difficulties.

The pump system was pulled from the well in April 2001 to facilitate packer testing of the individual perforated intervals. Packer testing allows assessment of the water quality, transmissivity and specific capacity of each discrete interval. The packer test data provide information about potential water quality changes with depth, as well as the relative contribution of each perforated interval to the combined discharge. The results of the packer testing are summarized in the Orton-23 Recovery Well Packer Test Report (Charter Oak, 2001d). Based on the data collected during the packer tests, the following activities were implemented to bring the Orton-23 well back into service at full capacity:

- Re-perforated the lowest perforated interval to increase open area and possibly improve well efficiency;

- Redeveloped the well; and,

- Installed a variable speed drive with an automatic level control sensor to maintain maximum flow rate while keeping the pumping water level higher than the uppermost perforated interval.

Maintaining the pumping water level above the upper perforated interval has addressed concerns regarding increased sediment load and air entrainment in the discharge stream. Additionally, use of the variable speed drive will reduce wear on the pump motor and increase operational efficiency. It does not appear that the additional perforations resulted in a noticeable improvement in the overall specific capacity of the well.

Based on available operational data, it has been observed that water level declines due to a combination of pumping drawdown and reduced recharge have necessitated reduced pumping rates at four of the five recovery well locations. Several alternatives addressing these drawdown limitations have been explored including, installation of new valves to better control flow, smaller pumps, variable speed motors and timers to cycle pumping at an appropriate frequency to maintain suitable water levels. The alternatives that have been implemented as of December 2001 are summarized in Table 12-1.

Table 12-1: Extraction Well Design Changes

Extraction Well	Design Changes
R-1	Installed a pressure sustaining valve (PSV) to provide better flow control.
R-2	Removed impellers from existing pump to reduce pressure in the HDPE pipeline. Future conditions may warrant the installation of a timer to automatically cycle the pump on and off.
R-3	Installed a smaller pump in the 40 to 60 gpm flow range.
Orton-23	Installed a variable speed drive with automatic level control, using existing pump and motor.
Mapleton No. 1	No changes are anticipated.

Table 12-2 contrasts the design pumping rate versus anticipated long term pumping rates for the recovery wells. Future water level conditions may necessitate additional changes in flow rates. As more data is collected, changes in flow rate may also be dictated by a desire to increase the efficiency of solute recovery.

Table 12-2: Design Pumping Rate versus Projected Long Term Pumping Rates

Recovery Well	Design Pumping Rate (gpm)	Projected Long Term Pumping Rate (gpm)
R-1	500	300 – 400
R-2	50	30 – 40
R-3	120	40-60
Orton-23	1000	800 – 900
Mapleton No. 1	1000	950 – 1100

Now that the recovery system has been installed, an on-going data collection program is necessary to assess recovery system performance. As part of the recovery system performance evaluation, it may be desirable, at times, to periodically adjust flow rates or shut down certain wells for weeks or months at a time to observe changes in water levels and water quality. For instance, the temporary shutting down of wells may provide insight into potential tailing and rebound affects caused by sorption of certain CEMs to aquifer materials and/or diffusion of solutes into fine-grained deposits. Changing hydrogeologic conditions may also warrant modifications to recovery system operations. An example may be raising or lowering of discharge rates in response to changes in area water levels. While decisions regarding long-term operation of the recovery system will not be made without technical justification and DWQ concurrence, flexibility in routine operations of the recovery systems is necessary to ensure proper operation of the recovery system and to collect appropriate performance monitoring data. Periodic shutdowns and/or flow adjustments will be made following notification of, and discussions with DWQ staff. Formal written approval shall not be necessary for these temporary activities. Extraction wells will not be taken out of service permanently without formal written approval by DWQ.

12.3 GAC Treatment System Operations

No changes in GAC treatment system operations and monitoring are proposed at this time. Operation, maintenance and communication procedures for the GAC treatment systems are established in two documents.

- Granular Activated Carbon Treatment System – Operation, Maintenance & Communications Manual, Spanish Fork GAC Treatment System, Spanish Fork, Utah (Charter Oak, Revised April 2002)

- Granular Activated Carbon Treatment System – Operation, Maintenance & Communications Manual, Mapleton and Orton GAC Treatment Systems, Mapleton, Utah (Charter Oak, Revised April 2002)

These documents are reviewed annually and will be modified as necessary (i.e. contact names and numbers, procedural changes, etc.). These O&M manuals are maintained as separate documents. The latest revised versions of these documents were provided to representatives of Mapleton, Spanish Fork and DWQ in May 2002. In the future, revised documents or replacement pages will be provided on an as-needed basis.

12.4 Performance Monitoring

The corrective action relies on a combination of ground water extraction and treatment (active restoration) and natural attenuation. This section describes selected performance monitoring activities designed to assess the elements of the corrective action.

12.4.1 Extraction System Performance

The primary objective of the ground water extraction and treatment system is to restore beneficial use of the ground water resource. That objective has been achieved by making the extracted water available for use by local municipalities.

Secondary objectives included hydraulic containment of portions of the affected region where COC concentrations are relatively high, and to lower COC concentrations in the regional aquifer by the removal of solutes. According to "Methods for Monitoring Pump-and-Treat Performance" (EPA, 1996), there are several established methods for monitoring recovery system performance. The various monitoring methods are described briefly below, as well as reasons why these methods may or may not be appropriate for the study area.

12.4.1.1 Hydraulic Containment

12.4.1.1.1 Water Level Data

Hydraulic containment is typically assessed using water level data and capture zone analysis. Hydraulic containment performance may be determined by measuring inward gradients which indicate that ground water flow is inward, toward the pumping well – both horizontally and vertically. The large scale of the project and heterogeneity of the hydrogeologic system complicates the use of available water level data to monitor inward hydraulic gradients. Wells for which water level data are available are completed at differing depths and are open to aquifer materials having variable physical and hydraulic properties; therefore, accurate gradients cannot be determined from these data. This is particularly true within or adjacent to recharge areas where downward vertical gradients are present. Based on the foregoing, the approximate steady state containment area was estimated based on the interpretation of available water level data in the context of the complex hydrogeology and conceptual model of the study area.

Because of large size of the study area and the heterogeneity of the hydrogeologic system, it is impractical to install sufficient monitoring wells or piezometers to completely characterize the ground water flow system and hydraulic gradients in the vicinity of the pumping wells. The installation of additional monitoring wells or piezometers to assess hydraulic containment is not recommended at this time. However, ongoing data collection and analysis may identify a need for additional data from selected locations. Recommendations for additional monitoring well or piezometer locations may be made in the future.

Water levels will typically be measured from operating extraction wells at a weekly frequency during routine weekly extraction well inspections. This approximate frequency is desirable to ensure proper pumping water levels in the extraction wells. The frequency of water level measurements at the extraction wells may be reduced based upon the review of the collected water level data. Water levels from observation wells

12.4.1.2.2 Mass Removal Methods

EPA (1996) identifies other performance methods based on mass removal rates and solute mass-in-place trends. These methods include: (1) the rate of solute mass removed by pumping (mass/year); (2) The rate of reduction of solute mass-in-place (mass/year); and, (3) the rate of reduction of the volume of the aquifer containing COCs above cleanup standards.

The first two methods require estimates of the mass of solutes present in the aquifer. Two measures of solute mass-in-place are typically used.

Dissolved mass-in-place (M_w) represents the mass of solutes dissolved in the ground water. The estimate of M_w should not be used at sites where free product is present in the aquifer or where solutes are sorbed to aquifer materials.

An estimate of the total mass-in-place (M_T) is more appropriate when sorption is a consideration as this estimate accounts for the mass of sorbed solutes. The total mass-in-place at a specific time is estimated from the following equation:

$$M_T = \int_A (nC_w + \rho_b K_d C_w) b \, dx dy$$

Where

M_T = Total solute mass in place
n = porosity
C_w = Solute concentration in water
ρ_b = Bulk density of aquifer materials
K_d = Soil water partition coefficient
b = Thickness of affected region
A = Area of affected region

EPA (1996) notes that M_T is typically difficult to estimate because of paucity of available data, particularly with regard to K_d estimates. Calculation of the area of the affected region is also complicated because it generally requires interpolating sparse data to develop a continuous area of solute distribution. Because of the long and variable source history at this site, no reasonable estimate can be made about the total mass of solutes that may have entered the regional aquifer so there is no basis to compare with estimates of M_T.

Determining the rate of mass removal (M_R) of individual or combined solutes is straight forward and is calculated by:

$$M_R = Q_T C_w$$

Where

M_R = Mass of solute(s) removed
Q_T = Total flow rate
C_w = Solute Concentration in discharge

M_R estimates for this project can be derived either by summing the M_R values calculated from combined flow rates and solute concentrations entering each GAC treatment system and/or by summing the M_R values calculated for each individual extraction well. These values will be comparable, although not identical due to variations in analytical results and differences in flow measurements between the individual wells and at the treatment systems.

Comparing the rate of solute mass removal to the total solute mass-in-place is often used to assess restoration progress. This is typically done by plotting the cumulative mass removed and the total estimated mass-in-place over time. If the rate of solute mass extracted approximates the rate of dissolved mass-in-place reduction, then the solutes removed by pumping are primarily from the dissolved phase. If the rate of mass removal greatly exceeds the rate of dissolved mass-in-place reduction, then a solute source is likely to be present. The solute source could be free product, an active source area, sorbed solutes or solutes that have diffused into low permeability deposits.

In some cases, extrapolating the trend of the mass removal rate curve or the cumulative mass removed curve may be used to project cleanup times. However, EPA cautions that progress inferred from mass removal rates can be misleading or misinterpreted when solutes are sorbed to aquifer materials or diffused into less permeable deposits. EPA also notes that mass removal rates can be misinterpreted where dissolved solute concentrations decline rapidly due to mass transfer rate limitations (desorption, diffusion), dewatering a portion or all of the affected zone, dilution with clean ground water flowing to extraction wells or the removal of a high concentration slug of solutes.

A reasonable and defensible estimate of total mass-in-place cannot be made. Any estimates of total mass-in-place are likely to have substantial error and could lead to inappropriate conclusions about recovery system performance. However, the data necessary to calculate mass removal rates are collected on a monthly frequency at both the individual recovery wells and at the influent to the GAC treatment systems. We do not believe that a sufficient amount of time-dependent data has been collected to make reasonable mass removal rate cleanup time projections at this time. As more data becomes available through continued monitoring, mass removal rate trends and cumulative mass removed trends will be evaluated to determine if they may be effective tools for projecting cleanup timeframes. Rate limiting mechanisms such as desorption and diffusion could limit the applicability of this performance evaluation tool. This evaluation will be part of the ongoing data collection and evaluation program.

12.4.1.2.3 Concentration Trends

EPA (1996) cites several statistical methods that are used to evaluate concentration trends. Both parametric (for data with a normal or known distribution) and non-parametric (for data with an unknown or non-normal distribution) techniques are described and are suitable for use on this project. A detailed discussion of statistical techniques is beyond the scope of this document; however, the manners in which the statistically reduced data may be utilized are presented herein.

EPA (1996) distinguishes between short-term statistical analyses, generally used for ongoing operational assessment and long-term statistical analyses that are typically used to determine termination of the remedial action.

According to EPA (1996) statistical techniques for analyzing short-term trends are used to answer questions of the following nature:

- Are concentrations in individual wells (recovery or observation) at the site currently below or above a cleanup standard? What is the level of confidence that this is true?

- Is the average sitewide concentration of a COC currently below or above a cleanup standard? What is the level of confidence that this is true?

- Is the current sampling program sufficient to make inferences about concentration trends?

- Are there areas where cleanup standards have been attained with confidence?

If the data is normally distributed or the distribution is known, a set of concentration data taken over a year can be described though simple sample statistics such as sample mean, standard deviation, standard error and percentile. Sample based comparisons can be made using hypothesis testing of differences between the sample mean and a site cleanup goal or other standard. Standard error (sample variability) is used to characterize the precision of sample-based comparisons through confidence intervals.

If comparisons of means to cleanup standards are made repeatedly (i.e. each year) then a general evaluation of the site cleanup can be made over time.

Non-parametric statistical techniques are used for data having a non-normal or unknown distribution. Non-parametric tests produce a simple confidence interval that is designed to contain the true or population median concentration with specified confidence. If cleanup level falls within the statistically derived confidence interval, then the median concentration does not differ significantly from the cleanup standard. If the lower confidence interval exceeds the cleanup standard, then the concentration is statistically higher that the cleanup standard.

The statistical analysis of long-term concentration trends is typically used for making recovery system termination decisions or to determine if restoration goals are feasible. These statistical methods include regression techniques and time-series analysis. This discussion is limited to both parametric and non-parametric trend analyses methods. EPA notes that changes in system stresses, such as pumping rate changes or seasonal recharge fluctuations, may result in changes in concentration variation and correlation that can complicate regression analyses. Certain trends can be removed from the data prior to regression analyses.

Regression analyses are parametric techniques that assume a normal or known distribution. Both linear and curvilinear regression models can be used, although most concentration declines in the environment will be curvilinear. An assessment of the fit of the theoretical curve or regression model is required. Once an appropriate fit of the regression is determined then predictions and conclusions about trends and future concentrations can be made.

Non-parametric trend tests such as the Mann-Kendall trend test, Sen's nonparametric procedure or the LOWESS curve-smoothing procedure are recommended when the residual from regression analyses are not normally distributed or have an unknown distribution. These non-parametric methods may be used to calculate a model for concentration trends over time.

The "zero slope" method is a regression procedure that is commonly applied for termination analysis. This method requires the demonstration that solute concentrations have stabilized at levels below the cleanup objectives and remain at or below that level. Solute concentrations in ground water typically trend toward an asymptotic limit (zero slope) with time. The zero slope method is a likely candidate for establishing termination criteria for this project.

12.5 Natural Attenuation

The natural attenuation mechanisms (dilution and dispersion) are passive and have no ongoing operational demands or requirements other than water quality monitoring. Because biodegradation or other destructive and/or transformational natural attenuation processes are not practically relevant in the study area, monitoring of certain water quality parameters (i.e. D.O., pH) is not necessary, nor is the analyses of breakdown products. Only the monitoring of COCs is necessary to assess the effectiveness of natural attenuation. Solute behavior and concentrations trends outside of the containment zone and at the perimeter of the affected area are the most significant considerations for ongoing assessment of natural attenuation. Potential for increasing solute concentration trends that are present at monitoring wells that are either known to be outside of the containment area (MW-14D) or may be outside of the containment area (MW-10D, Young) warrant the installation of additional monitoring wells. Proposed new monitoring well locations are discussed in the following section.

12.6 Ground Water Monitoring Plan

12.6.1 Regional Aquifer Monitoring Program

Figure 12-1 presents the locations of existing water level and water quality monitoring locations open to the regional aquifer that will be used for the ongoing assessment of the corrective action. Table 12-3a summarizes the types of data collected and frequency of sampling at each location. The monitoring program includes extraction wells, monitoring wells, municipal wells and private wells. Six existing RFI monitoring wells that are open to the regional aquifer have been added to the proposed monitoring program. These wells will be sampled for four quarters beginning in the first quarter of 2002. After four quarters of data have been collected from these wells, these data will be evaluated and recommendations will be made regarding whether or not any of these wells will be incorporated into the future monitoring program. The current monitoring plan was implemented in January 2002 in accordance with approval letters received from DWQ on November 6, 2001 and January 18, 2002 (Appendix J).

As additional monitoring wells that are open to the regional aquifer are constructed, they will also be added to the regional aquifer monitoring program. After four quarters of data have been collected from these wells, these data will be evaluated and recommendations will be made regarding whether or not any of these new monitoring wells will be incorporated into the future regional aquifer monitoring program.

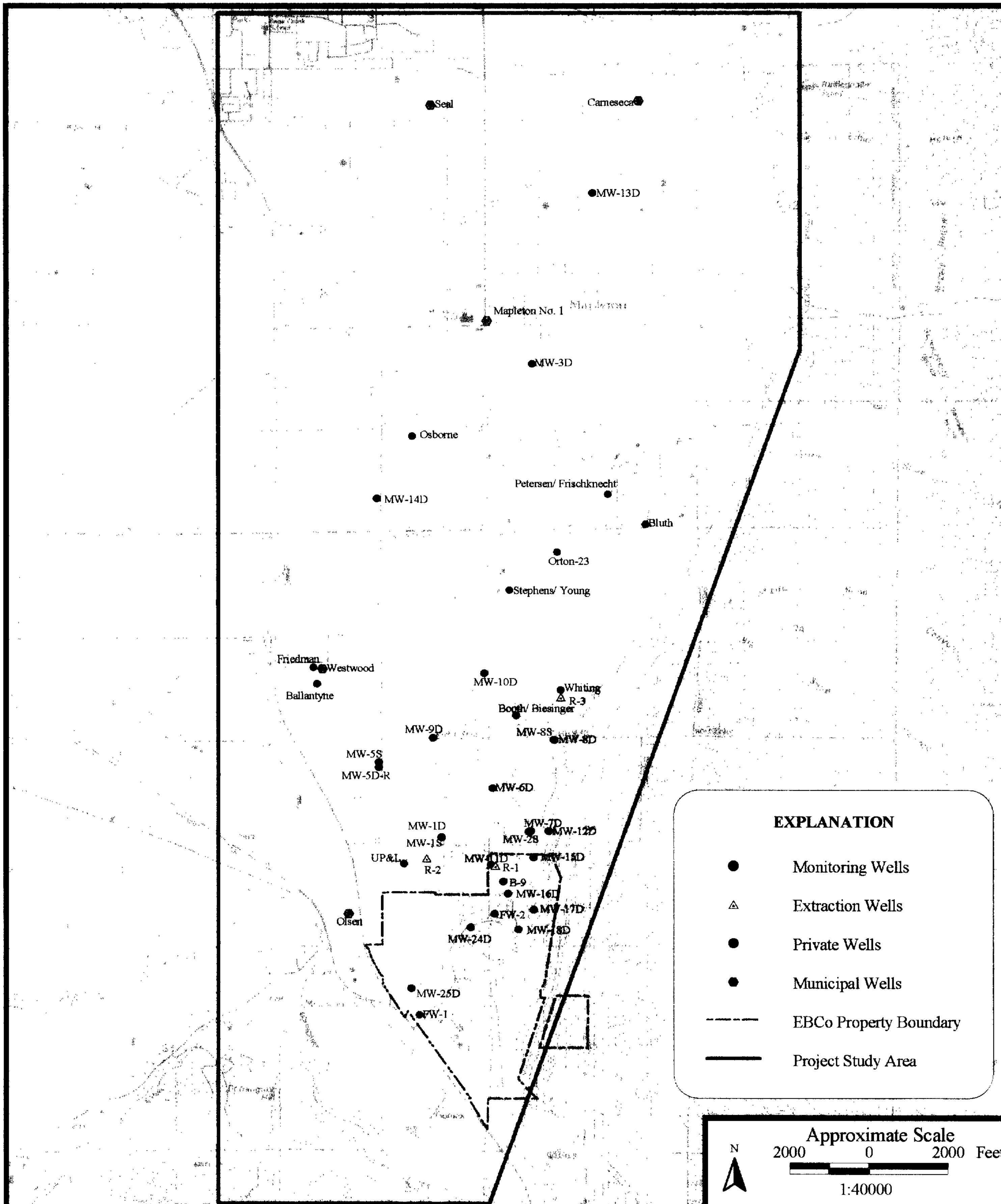
At times, certain wells may be inaccessible due to surface conditions or in the case of private wells may not be operating during the winter. EBCo also has no control as to the functionality of private wells and municipal wells. Wells can only be sampled as conditions allow.

Water quality samples from these wells will be analyzed for nitrate-nitrogen and in most instances CEMs.

Based on the data collected in accordance with the proposed monitoring plan, changes to the monitoring plan may be made in the future. Anticipated changes may include reductions or increases in monitoring frequency of water levels or water quality samples, removal of some CEMs from the analyte list, the addition of new monitoring locations or the permanent removal of some wells from the monitoring program. Proposed changes will be addressed in the annual progress report and will not be made without DWQ approval.

12.6.2 Additional Regional Aquifer Monitoring Locations

In accordance with the DWQ approval letter dated January 18, 2002, three additional monitoring wells will be installed during 2002 to assess water quality conditions in the regional aquifer. Based on solute distribution and proposed monitoring well locations,



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Proposed Ground Water Monitoring Program

FIGURE 12-1

Table 12-3a: Proposed Monitoring Plan for Extraction and Monitoring Wells That Are Open to the Regional Aquifer

	Water Levels					Nitrate-nitrogen					CEMs				
Well ID	W	M	Q	S	A	W	M	Q	S	A	W	M	Q	S	A
R-1	X	X					X					X			
R-2	X	X					X					X			
R-3	X	X					X					X			
Orton-23	X	X					X					X			
Mapleton No. 1	X	X					X					X			
MW-1S		X						X					X		
MW-1D		X						X					X		
MW-2S		X						X					X		
MW-3D		X						X					X		
MW-5S		X							X						X
MW-5D		X						X					X		
MW-6D		X						X					X		
MW-7D		X						X					X		
MW-8S		X						X					X		
MW-8D		X						X					X		
MW-9D		X							X						X
MW-10D		X						X					X		
MW-11D[1]		X						X					X		
MW-12		X								X					
MW-13D		X							X						X
MW-14D		X						X					X		
MW-15D[1]		X						X					X		
MW-16D[1]		X						X					X		
MW-17D[1]		X						X					X		
MW-18D		X						X					X		
MW-24D		X						X					X		
MW-25D		X						X					X		
MW-28D[2]		X						X					X		
MW-30D[2]		X						X					X		
MW-31D[2]		X						X					X		
MW-32D[2]		X						X					X		
B-9		X							X						X
Westwood								X					X		
Carneseca								X					X		
Seal								X					X		
Olsen								X					X		
Whiting		X						X					X		
UP&L								X					X		
Bluth[3]		X						X					X		
Frischknecht								X					X		
Young		X						X					X		
Osborne								X							
Ballantyne								X							
Friedman									X						
Booth		X													
FW-1								X					X		
FW-2		X						X					X		

[1] These wells will be sampled for both total and dissolved lead for four quarters starting in 2002.

[2] These wells will be added to the monitoring program once they are completed.

[3] The Booth well will be sampled when equipped with a new pump.

W Weekly Frequency
M Monthly Frequency
Q Quarterly Frequency
S Semi-annual Frequency
A Annual Frequency

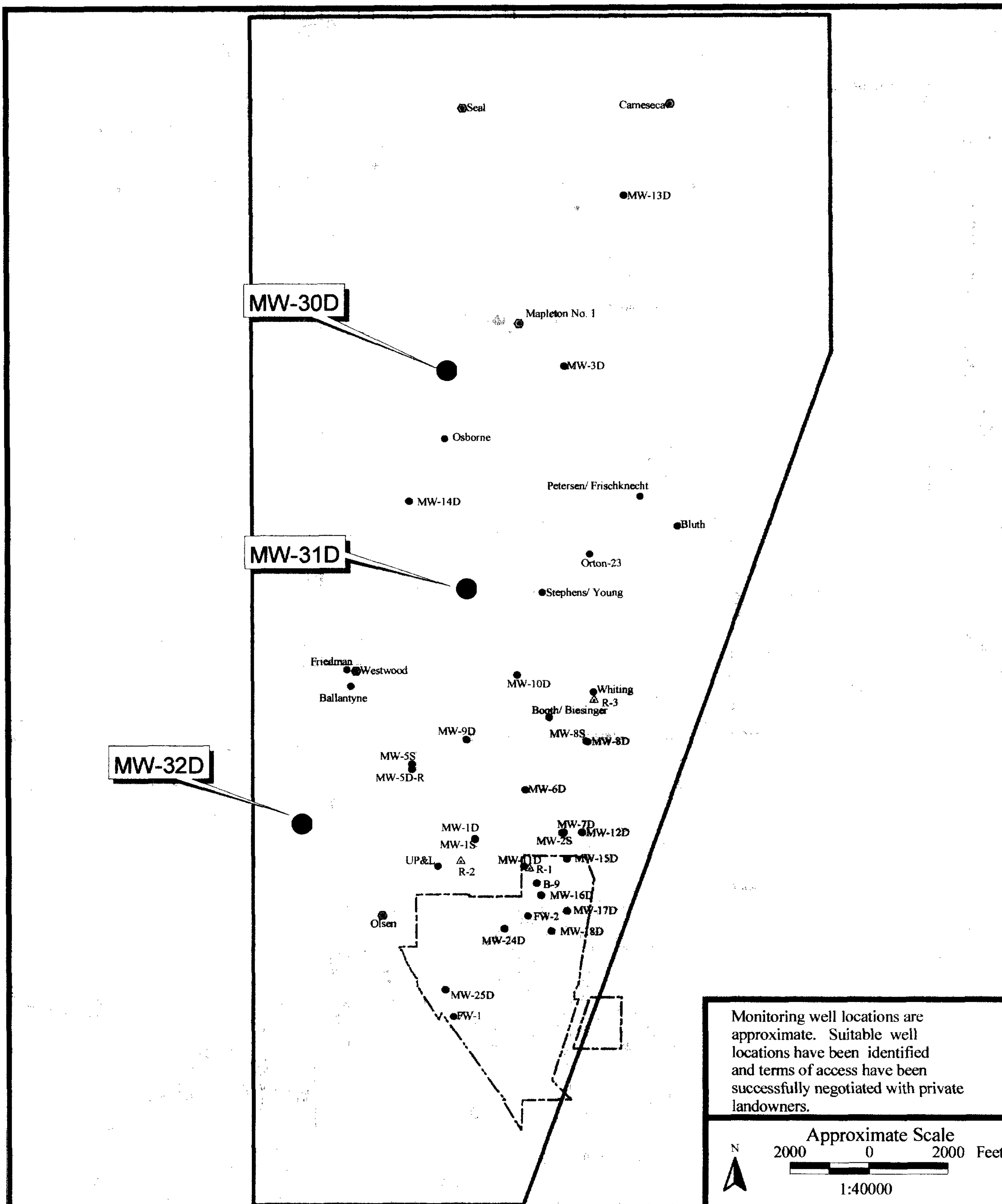
these wells will be set well below the water table of the regional aquifer, between 350 and 500 feet below ground surface. The additional monitoring wells are approximately located in Figure 12-2. Suitable well locations have been identified and access agreements have been negotiated with the landowners. The rational for each of the wells is as follows:

- MW-30D is approximately half way between MW-14D and Mapleton No.1 and a little to the west. There are no trends in CEM or nitrate-nitrogen concentrations in Mapleton No. 1. Nitrate-nitrogen concentrations are below 10 mg/L and CEM concentrations are below proposed CACLs. CEMs have not been detected in MW-14D; however, nitrate concentrations at MW-14D exhibit an upward trend. The purpose of this monitoring well is to assess water quality conditions in the regional aquifer at an approximate depth range of 350 to 500 feet below the ground surface and at the approximate perimeter of the affected area.

- MW-31D is located between MW-10D, Young and MW-14D. Upward trends in RDX concentrations are present at MW-10D and Young. Nitrate-nitrogen concentrations exceed 10 mg/L at MW-10D and Young and increasing trends in nitrate-nitrogen concentrations are observed at MW-10D and MW-14D. Assuming ground water flow directions in this area are roughly perpendicular to the approximate ground water level contours, solutes may be migrating toward MW-14D from the locations of Young and MW-10D. The purpose of this monitoring well is to assess water quality conditions in the regional aquifer at an approximate depth range of 350 to 500 feet below the ground surface and at a location that may be down gradient of an area of elevated COC concentrations.

- MW-32D is located west of UP&L and between MW-5D and Olsen. Historic nitrate-nitrogen concentrations at MW-1S, MW-1D and UP&L exceeded the 10 mg/L MCL for nitrate-nitrogen, although nitrate-nitrogen concentrations in these wells are presently below 10 mg/L. CEMs are present in these wells and RDX concentrations are above the proposed interim ground water quality goal of 2 µg/L. Nitrate-nitrogen concentrations in MW-5D have remained below 10 mg/L and CEM concentrations at MW-5D have reamined low. The Olsen well contains no CEMs but historic nitrate-nitrogen concentrations have been high and present nitrate-nitrogen concentrations are around 10 mg/L. Assuming ground water flow directions in this area are roughly perpendicular to the approximate ground water level contours, solutes may be migrating to the west from the locations of MW-1S, MW-1D and UP&L. The purpose of this monitoring well is to assess water quality conditions in the regional aquifer at an approximate depth range of 350 to 500 feet below the ground surface and at a location that may be down gradient of an area of elevated COC concentrations.

It is also anticipated that the Booth well will be sampled for COCs. Lithology and nitrate-nitrogen concentrations from 1989 indicate that this well is open to a sand and gravel unit. Sampling of this well might provide data useful for understanding the



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Additional Monitoring Well Locations

FIGURE 12-2

hydrogeologic system in this portion of the study area. The existing pump is not operational and no power is presently available at this location. The existing pump must be replaced with a permanent or temporary pump to allow sampling. EBCo plans to implement this activity during 2002. DWQ approved this activity in their January 18, 2002 comment letter.

As described previously in this CAP, one additional new monitoring well (MW-28D) that is open to the regional aquifer is being installed in the northeast area of the Plant, with oversight by the DSHW. Once this well is completed, it will be incorporated into the regional aquifer monitoring program as presented in Table 12-3a.

12.6.3 Perched Ground Water Monitoring Program

As part of the ongoing RFI, eight monitoring wells have been installed that are open to perched ground water identified in the northeast area of the Plant. As described previously in this CAP, two additional monitoring wells open to the perched ground water are scheduled for completion in 2002, with oversight by the DSHW. Table 12-3b presents a proposed monitoring plan for these perched ground water wells. The proposed monitoring program for the existing perched ground water wells was initiated during the first quarter of 2002. After four quarters of data have been collected from these wells, these data will be evaluated and recommendations will be made regarding possible future monitoring of perched ground water.

12.6.4 Assessment of Provisional COCs

This CAP addresses the regional unconsolidated aquifer. While certain constituents have been identified in perched ground water present at the Plant, this perched ground water is not part of the regional aquifer system. Sampling to assess the provisional COCs is limited to selected wells that are open to the regional unconsolidated aquifer.

The CEMs 2,4,6-TNT, 2,4-DNT and 2,6-DNT are identified as provisional COCs. Analysis for 2,4-DNT was initiated in the first quarter 2001 sampling event. Additionally, as of the first quarter of 2001 the analytical method has been modified to include dual column confirmation of these three compounds should they be preliminarily identified using the SW846-8330 Modified method. These three compounds were not detected in the regional aquifer during 2001. These three compounds remain provisional COCs at this time. If after four quarters of monitoring (scheduled to be completed in the fourth quarter of 2002), these three compounds are not identified in the regional aquifer, they will be removed from the provisional COC list. On the other hand, if detected in the regional aquifer, these compounds will be added to the COC list and specific modifications to the monitoring program will be recommended.

Although NG has not been identified in wells open to regional aquifer after over five years of monitoring, it is included as a provisional COC due to its presence in perched ground water in the northeast corner of the Plant. It is proposed that new monitoring

Table 12-3b: Proposed Monitoring Plan for Monitoring Wells Open to Perched Ground Water Identified in the Northeast Area of the EBCo Site

	Water Levels				Nitrate				Sulfate				Lead[1]				CEMs			
Well ID	M	Q	S	A	M	Q	S	A	M	Q	S	A	M	Q	S	A	M	Q	S	A
MW-15S	X					X				X				X				X		
MW-16S	X					X				X				X				X		
MW-17S	X					X				X				X				X		
MW-18S	X					X				X				X				X		
MW-19S	X					X				X				X				X		
MW-21S	X					X				X				X				X		
MW-23S	X					X				X				X				X		
MW-27S[2]	X					X				X				X				X		
MW-28S[2]	X					X				X				X				X		

[1] Both total and dissolved lead will be analyzed.

[2] These wells will be added to the monitoring program once they are completed.

M Monthly Frequency
Q Quarterly Frequency
S Semi-annual Frequency
A Annual Frequency

These monitoring wells will be sampled for a period of of four quarters beginning in the first quarter of 2002. After four quarters of sampling, the monitoring program may be modified in accordance with Section 12.11 Operational Flexibility, based upon review of the data collected.

wells open to the regional aquifer in this area of the Plant site be sampled for four quarters and analyzed for NG. If NG is not detected in those wells after four quarters of sampling, NG will be removed from the provisional COC list. If NG is detected in the regional aquifer, it will be added to the COC list and specific modifications to the monitoring program will be recommended. Sampling of these wells to assess the NG commenced in the first quarter of 2002.

Lead has been identified as a provisional COC due to the preliminary RFI monitoring well data and data collected from MW-11D during the R-1 pump test. Commencing in the first quarter of 2002, monitoring wells MW-11D, MW-15D, MW-16D and MW-17D are being sampled for total and dissolved lead for four quarters. If dissolved lead is present at concentrations of less than 0.015 mg/L for four consecutive quarters, lead will be removed from the provisional COC list. If dissolved lead is detected in the regional aquifer at a concentration higher than 0.015 mg/L, lead will be added to the COC list and specific modifications to the monitoring program will be recommended.

12.7 CACLs

CACLs have been proposed for COCs that have been routinely identified in the regional aquifer. CACLs have not been proposed for provisional COCs, at this time. Ground water quality protection standards have been established for nitrate and dissolved lead by the state of Utah (UAC R317-6, Table 1). These state standards are CACLs by definition. CACLs are proposed for HMX, EGDN, DEGDN, TEGDN, TMETN, BTTN, PETN and specialty nitrate esters as a group. As noted in Section 9.0, a CACL has not been proposed for RDX. Rather, an interim ground water quality goal of 2 μg/L is proposed. This interim water quality goal is numerically equivalent to the RDX HA. A CACL for RDX may be proposed upon completion of a review of RDX-related health information by the joint DOD/EPA program whose purpose is revision of the RDX IRIS file. No additional CACL development activities are proposed at the present time.

The ability to develop and propose ACACLs is preserved with submission of this document. While the ultimate goal is to restore water quality in the regional aquifer to proposed CACLs, additional water quality and recovery system performance data is necessary before it can be determined whether attaining the proposed CACLs through active restoration is technically feasible.

12.8 Institutional Controls Program

No major changes to the institutional controls program are proposed at this time.

Two recommendations are made to assist in keeping the public informed of ground water remediation activities:

- EBCo, in cooperation with DWQ, will provide Mapleton and Spanish Fork with brief, biannual informational updates. In the past, the municipalities have distributed these updates with municipal mailings or have made them available at City office buildings. This has proved to be a simple and effective way to distribute this information.

- A document repository has been established in both Spanish Fork and Mapleton for RFI related documents. A copy of the approved CAP will be placed in the document repository so that the public may access this document.

12.9 On-site Controls

Potential corrective measures addressing impacts to on-site soils and perched ground water will be managed under the RCRA Corrective Action program. It is anticipated that the implemented corrective measures will be protective of ground water quality within the regional aquifer.

12.10 Termination Criteria

For the purposes of this CAP, the term "termination" is applicable to individual extraction wells, GAC treatment systems and/or the entire ground water extraction and treatment system. The ability to predict an estimated time to attain sitewide cleanup goals or to make a determination of technical impracticability is several years away. Ground water extraction facilities have only been operational for two to three years and it is premature to define termination criteria at this time. Likewise, a detailed discussion of post-termination monitoring requirements is premature. Conversely, decisions regarding the operation of individual extraction wells (i.e. R-2) could be made within a year or two as additional data is collected and analyzed. As these considerations become relevant, these issues will be raised in future discussions with DWQ and in annual progress reports. No long-term or permanent changes to the operation of the ground water extraction and treatment systems will be made without technical justification and DWQ concurrence.

As explained throughout this document, the complexity of the hydrogeologic system and properties of some of the solutes complicate the assessment of the corrective action. The following factors must be considered in the overall analysis:

- Variability of water levels and hydraulic gradients will affect the containment area established by the extraction wells.

- Sorption and diffusion of solutes are likely to be rate-limiting mechanisms that control the timing and/or feasibility of cleanup.

- Tailing and rebound affects may be significant issues that will need to be addressed and considered in establishing future operating conditions, termination criteria and post termination monitoring. Pulsed pumping, the periodic stopping and starting of extraction wells, may become a future operational consideration to address tailing.

- The periodic re-saturation of unsaturated deposits due to fluctuations in water levels may result in the mobilization of additional solutes into the regional aquifer.

12.11 Operational Flexibility

Plans for typical future operation of ground water extraction wells and treatment system are proposed in this CAP. However, all ground water remediation projects are dynamic and a high degree of operational flexibility is warranted to ensure effective ground water recovery and treatment and the collection of useful performance monitoring data. Table 12-4 establishes the forms of operational flexibility that are anticipated for this project and the proposed associated level of DWQ involvement in approving these operational changes.

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Table 12-4: Operational Flexibility

Operation	Description	DWQ Involvement
Periodic, short-term cessation of extraction well operation	Extractions wells are temporarily turned off due to electrical problems, equipment issues, maintenance or other similar activities. These shutdowns may be planned or unplanned and last for hours up to a month.	No DWQ notification or response is necessary.
Periodic longer-term cessation of extraction well operation	Planned shutdown of extraction wells to assess hydrogeologic response. This may include changes in water levels or to assess possible tailing and rebound effects. Extraction well R-3 is a likely candidate for such activities. Shutdowns may last for several months.	With the exception of R-3, written notification of DWQ staff level personnel and written DWQ concurrence. DWQ staff will be verbally notified of plans to temporarily shut down the R-3 well.
Termination of extraction well operation	Permanent removal of extraction well(s) from ground water recovery system	Technical justification for termination presented in Annual Report. Written DWQ concurrence.
Changes in extraction well discharge rates	Changing water level conditions require changes in extraction well(s) discharge rate(s).	No DWQ notification is necessary. Changes in discharge rates will be documented in Annual Report.
Water level monitoring frequency	Weekly water level measurements may not be necessary or not performed at extraction wells, particularly if a well is not operating.	No DWQ notification is necessary.
Water level monitoring locations	Monitoring locations may be periodically inaccessible. Additional wells may be identified or installed where water level data can be acquired. Ongoing water level data collection may identify locations where water level data are not useful.	No DWQ notification is necessary Proposed changes will be presented in the Annual Report. Written DWQ concurrence is required.

Table 12-4: Operational Flexibility

Operation	Description	DWQ Involvement
Water quality monitoring frequency	Extraction well operations or accessibility problems may limit the ability to collect water quality data at the established schedule.	No DWQ notification is necessary.
	Long-term data collection may result in recommendations for changes to the water quality monitoring program.	Proposed changes will be presented in the Annual Report. Written DWQ concurrence is required.
Water quality monitoring locations	Extraction well operations or accessibility problems may limit the ability to collect water quality data at the established locations.	No DWQ notification is necessary.
	Long-term data collection may result in recommendations for changes to the water quality monitoring program.	Proposed changes will be presented in the Annual Report. Written DWQ concurrence is required.
Monthly GAC Treatment System Monitoring	GAC treatment system samples cannot be collected if extraction wells are not operating.	No DWQ notification is necessary.
	Carbon exchange events may preclude the need for monthly sampling	No DWQ notification is necessary.
	Continued monitoring may indicate that less frequent monitoring or seasonal changes in monitoring frequency are acceptable.	Proposed changes will be presented in the Annual Report. Written DWQ concurrence is required.

12.12 Annual Progress Reporting

Ongoing data collection and evaluation is an integral part of the corrective action. Decisions about the operation of the ground water recovery and treatment facilities will be made on an ongoing basis and based upon the cumulative data collected. An annual progress report will be submitted to DWQ after the end of the first calendar quarter of the following year. For example, the first annual report following the submission of this revised CAP will be submitted to DWQ in the second quarter of 2003. The annual report will summarize discharge, water level and water quality data collected during the previous year and provide an assessment of these data and recovery well and treatment system operations. The annual progress report will present proposed modifications to recovery system operations, monitoring program or institutional controls program. New information gathered from additional monitoring well construction or data collected during the ongoing RFI that is pertinent to the issues addressed in this CAP will also be presented in the annual reports.

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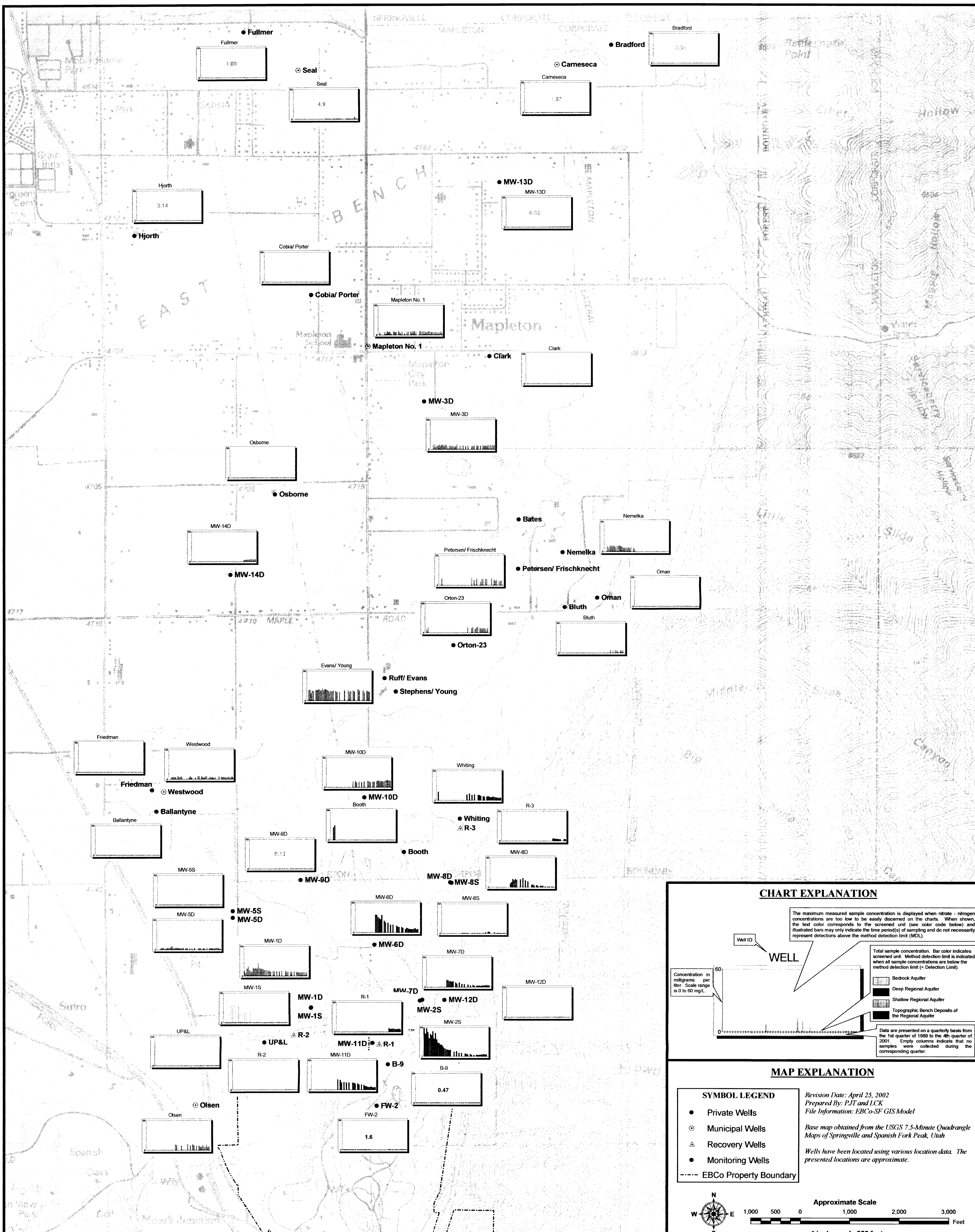
Spanish Fork, Utah

HYDROGRAPHS FROM SELECTED OBSERVATION WELLS

CHARTER OAK
Environmental Services, Inc.
4505 South Wasatch Blvd., Suite 360
Salt Lake City, Utah 84124
Telephone: (801) 277-6150 Facsimile: (801) 277-6151

FIGURE 6-20



Spanish Fork, Utah

NITRATE - NITROGEN DISTRIBUTION AND TREND MAP

CHARTER OAK
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4505 South Wasatch Blvd., Suite 360
Salt Lake City, Utah 84124
Telephone: (801) 277-6150 Facsimile: (801) 277-6151

FIGURE 7-2

CHART EXPLANATION

<MDL (where MDL is equal to the method detection limit in micrograms per liter for the indicated constituent) indicates that all sample concentrations are below the MDL for this constituent. When shown, the text color of the MDL corresponds to the screened unit (see color code below) and any illustrated bars only indicate the time period(s) of sampling and do not represent detections above the MDL.

Well ID

WELL

Concentration in micrograms per liter. Scale range is 0 to 60 ug/L.

Total sample concentration. Bar color indicates screened unit. Method detection limit is indicated when all sample concentrations are below the method detection limit (< Detection Limit).

- Bedrock Aquifer
- Deep Regional Aquifer
- Shallow Regional Aquifer
- Topographic Bench Deposits of the Regional Aquifer

Data are presented on a quarterly basis from the 3rd quarter of 1995 to the 4th quarter of 2001. Empty columns indicate that no samples were collected during the corresponding quarter.

MAP EXPLANATION

SYMBOL LEGEND

- Private Wells
- Municipal Wells
- Recovery Wells
- Monitoring Wells
- EBCo Property Boundary

Revision Date: April 26, 2002
Prepared By: PJT and LCK
File Information: EBCo-SF GIS Model

Base map obtained from the USGS 7.5-Minute Quadrangle Maps of Springville and Spanish Fork Peak, Utah

Wells have been located using various location data. The presented locations are approximate.

Approximate Scale

1,000 500 0 1,000 2,000 3,000 Feet

1 inch equals 850 feet

Spanish Fork, Utah

RDX DISTRIBUTION AND TREND MAP

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FIGURE 7-3